Evidence of Teaching Practices and Strategies Through the Course Complexity Typology

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1Chemical Engineering, 2Biological Systems Engineering, 3Civil & Environmental Engineering

Background

Wide Array of Teaching Practices and Strategies (WATPS)

• Use improves student outcomes and persistence in engineering
• Traditionally underutilized in engineering classrooms

Course Complexity

• Extent to which WATPS are implemented and the challenge associated with implementation

Inductive Coding

• Method of categorizing text by theme
• Themes are developed as data is analyzed

Methods

Setting and Participants

• Engineering faculty at R1 university in Midwest U.S.

Data Collection

• Syllabi collected from Fall 2019 – Spring 2022 semesters
  • 7 departments represented in all data
  • Focus of this coding: 18 core courses from 1 department in Spring 2022

Data Analysis

• Inductively coded for WATPS relative to course complexity
• Two researchers established inter-rater reliability (IRR)

Research Question

The overall goal of this project is to investigate course complexity, as indicated by engineering faculty’s use of a WATPS, and the effect that COVID-19 had on this. The research question that drives this study is:

• How does course complexity change after a forced change?

Attendance/Participation:

Regular attendance is essential for all classroom experiences. It is a significant factor that promotes success in coursework. According to the National Center for Education Statistics (2018), students with regular attendance achieve higher grades than those who do not regularly attend class. It is up to you, ultimately, how successful you want to be in this course. You are expected to be active in class and participate until the last day. If you cannot access canvas from home, it is your responsibility to make other arrangements.

Summary:

This course is aimed at preparing students to carry out complete mechanical engineering projects. Specifically, formalized strategies for design are presented, and certain elements of mechanical design and analysis are explored in depth. Through homework, case studies, and projects, students will gain an improved understanding of mechanical design and the formal design process. At the conclusion of the course, students should be able to demonstrate that they are prepared to pursue a complete mechanical design project from problem statement to final reporting.

<table>
<thead>
<tr>
<th>Code</th>
<th>Definition</th>
<th>Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>SYL_InstJustPro</td>
<td>Instructor offers academic justification for</td>
<td>Count</td>
</tr>
<tr>
<td></td>
<td>assignments/policies</td>
<td></td>
</tr>
<tr>
<td>SYL_InstJustAca</td>
<td>Instructor offers professional justification</td>
<td>Count</td>
</tr>
<tr>
<td></td>
<td>for actions/policies</td>
<td></td>
</tr>
<tr>
<td>SYL_ExpectationsGrading</td>
<td>Inclusion of how assignments are graded</td>
<td>0-1</td>
</tr>
<tr>
<td>SYL_DetailedAssign</td>
<td>Nature of the details of the assignments in the syllabus</td>
<td>0-3</td>
</tr>
</tbody>
</table>

SYL_InstJustPro = 1
Reasoning: The instructor provides an overall reason students must take the class and bases this reason in the students’ increased ability to perform real world professional tasks.

SYL_InstJustAca = 1
Reasoning: The instructor offers a reason that they have a mandatory attendance policy. This reasoning is based on academic performance, stating that it is important for students to attend class in order to get a good grade.

SYL_ExpectationsGrading = 1
Reasoning: The instructor provides a breakdown of how assignments will be graded. In this case, they make it explicitly clear how points will be distributed and provide an example for students to follow.

SYL_DetailedAssign = 3
Reasoning: The details of the assignment are included explicitly. Students are provided with what content must be included in the lab report (2) as well as guidelines for formatting the report that must be followed (5). This makes this code a 3.

SYL_DetailedAssign = 2
Reasoning: Details focused on the nature of the assignment (content, value, etc.)

SYL_DetailedAssign = 0
No assignment details present

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